

REMARKS

Examiner Interview

The courtesy of the Examiner at an interview with Applicants' undersigned attorney on July 8, 2009 is greatly appreciated. The substance of the interview is believed accurately set forth in the Interview Summary which the Examiner issued at the conclusion of the interview.

As noted in the Interview Summary, the prior art Japanese references 2001-20311 and 11-21939 upon which the rejection of claim 1 and 5 were based were discussed as well as the teachings of previously cited Rogers US Patent 2,085,829. In addition, proposed amendments were discussed to improve the form of the claims in the application. No agreement was reached as to the allowability of any of the current claims.

In addition, the possibility of filing method claims was discussed with the Examiner. As noted in the Interview Summary, the Examiner indicated that method claims may better present allowable subject matter and that if new method claims were filed in an RCE, the method claims would be considered.

Pending Claims

Claims 1-10 have been canceled without prejudice or disclaimer and new method claims 11-16 have been added.

Claim Rejections Under 35 U.S.C. §103

Claims 1-5 are rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese reference 2001-20311 in view of Japanese reference 11-21939.

Patentability of the Claims

As now set forth in new independent claim 11, Applicants are claiming a method of fabricating an operating arm for a construction machine with the arm being constructed from a plurality of joined plates whereby the arm is in the shape of a square tubular structure in cross section. The method includes the steps of preparing a wide plate-like material having alternately thick and thin wall portions in a transverse direction by butt welding side to side the plurality of joined plates having different thicknesses. The method further includes bending the wide plate-like material along the thick wall portions to form thick wall corner portions of the square tubular structure and to form a U-shaped structure having a U-shape in cross section with an opening on one side, through plastic deformation. Finally, the method includes welding a separate plate-like member to the U-shaped structure to close the opening on the one side thereof to form the square tubular structure.

Dependent claim 12 includes the further step of welding a boss mounting thick plate to be formed into a boss mount member to one longitudinal end of the wide plate-like material and bending the boss mounting thick plate into a U-shape in cross section simultaneously with the bending of the wide plate-like material to form the U-shaped structure. Dependent claim 13 calls for the thick and thin plates to be joined by high energy density welding of deep preparation in the preparing step.

Dependent claims 14, 15 and 16 further define the preparing step as including different positioning for the surfaces of the thin wall portion wherein the surface of the thin wall portion is either flush with the surfaces of the thick wall portion on an outside, positioning the surfaces of the thin wall portion indented from the surfaces of

the thick wall portions on an outside or positioning the surfaces of the thin wall portions indented from the surfaces of the thick wall portions on both sides.

As a result of the method of Applicants' invention, an operating arm is constructed having corner portions formed of the thick wall portions which provide significant strength for the arm. More specifically, the present invention provides an advantage that permits using steel plates of different thicknesses as the flat thin plates and the thick corner plates, whereby a plate material of versatile utility can be obtained and can be adopted as a starting material in the fabrication of an operating arm. The thick corner plates are in a flat shape before being bent into a convexly curved shape in the bending stage. When in a flat shape, the thick corner plates can be brought into a butt welding position simply by abutting a joining side against a flat thin plate. Thus, the flat thin plates and thick corner plates can be easily joined together by two-dimensional welding. This eliminates the need for three-dimensional welding and the joining parts can be aligned and set in relative positions in an extremely easy and functional manner.

The method of the present invention further provides the advantage that it makes it possible to increase the thickness of thick corner plates which form corner portions of the square tubular structure while reducing the thickness of flat thin plates which form flat side sections of the square tubular structure, for providing an operating arm which is satisfactory in strength and rigidity but is reduced in weight.

With respect to the previously cited prior art, Roger US Patent 2,085,829 does disclose a method of making beams in which a sheet A is rolled to form areas of different thicknesses that have thin middle and side portions 5, 6 and thicker intermediate portions 7, 8. Moreover, the sheet A is bent along the bending lines 9

that are formed at the junctions of the thick and thin portions. Rogers, however, does not disclose thick corner plates having a convexly curved shape between the sides of the thick plates. Rather, Rogers discloses that the bending along lines 9 is along the junctions of the thick and thin portions. Accordingly, there is no advantage of having thick corner plates in Rogers in which the convexly curved shaped portion extends between the sides of the thick plates, as claimed by Applicants.

The Japanese '311 reference discloses a rectangular shaped arm with a closed cross section (20) which is formed by a combination of corner members (21) which are located at four corner portions and four flat plates (22A), (22B) joined between the corner members (21). Since the corner portions 21 are formed in a curved configuration before welding, it is necessary that various corner members and flat plates need to be welded in a precisely aligned position in three dimensions, i.e. X-axis, Y-axis and Z-axis. The method of constructing the arm in the '311 patent therefore is much more complicated and difficult than that in Applicants' invention.

The Japanese '939 patent discloses a built up box type member such as a boom which is formed in a square tubular by joining together four steel plates, i.e., an upper plate (1U), a lower plate (1D), a left side plate (2L) and a right side plate (2R). The upper plate 1U is provided with a thin wall portion between right and left thick wall portions for increased rigidity and to reduce the weight of the boom. The lower plate 1D also is provided with a thin wall portion between right and left thick wall portions. A square tubular structure is formed by joining left and right side plates 2L and 2R with the thick wall portions with the upper and lower plates 1U and 1D by butt welding. Accordingly, the method used to construct the box type member of the '939 Japanese reference is quite different from the present invention wherein

the thick and thin plates are welded together while in a flat position in a horizontal plane and are then bent after being welded to form a U-shaped structure.

Accordingly, it is submitted that claims 11-16 are patentable.

CONCLUSION

In view of the foregoing amendments and remarks, the Applicants request reconsideration of the rejection and allowance of the claims.

Please charge any shortage in fees due in connection with the filing of this paper, or credit any overpayment of fees, to the deposit account of Mattingly & Malur, P.C., Deposit Account No. 50-1417 (referencing attorney docket no. H&C-122).

Respectfully submitted,

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